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ABSTRACT

An attempt to locate, review, classify, and abstract a more extensive set of measurement instruments and tests relevant to education and care programs for children from birth to age eight was made. Publishers' catalogs, test review, journals and other measurement documents have been examined to obtain a list. After extensive examination of existing tests, other taxonomy schemes, and discussion, a classification scheme based on four outcome domains--affective, cognitive psychomotor, and subject matter was constructed. An additional concern of the survey was a classification of the response methodologies with which certain early childhood educational objectives were being measured in the tests surveyed. The following categories of response methodologies were devised; matching, recognition, identification, written production, oral production, manual production, categorization, ranking, pair or N-item comparisons, ratings by others, ratings by child, and estimation. Next, characterization of other features of tests was made. Included were: accession number, minimum age and maximum age appropriate for tests, alphabetical character denoting domain, numeric characters denoting concept area and response methodology, alphabetic character denoting group or individual, and "I" if continuation is necessary. Advantages of this classification system are ease of retrieval and ease of cross-classification. It is intended that the final results of this survey will enlighten preschool educators about the availability of existing instruments and that these instruments will be utilized. (CK)

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TESTS AND MEASUREMENTS FOR EARLY CHILDHOOD EDUCATION PROGRAMS

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Introduction

This paper summarizes the procedures of an ongoing survey of available test and measurement instruments which might be utilized by personnel involved in operating or evaluating early childhood education programs. The impetus for the survey was an attempt to locate existing instrumentation which could be used in conjunction with the evaluation of specific early childhood educational objectives for the preschool aged child.

In mid-1971, few sources existed which would aid in the careful selection of such materials. Since that time, two sources have been published which can provide valuable assistance to administrators or evaluators seeking instrumentation within the early childhood field. CSE/ECRC Preschool/Kindergarten Test Evaluations, published jointly by the Center for the Study of Evaluation and the Early Childhood Research Center at UCLA, assesses 130 published tests by educational objectives. This useful guide also addresses itself to ratings of specific psychometric properties, administrative usability, and examines appropriateness of each of these instruments.

A second source of information is Tests and Measurements in Child Development: A Handbook by Orval G. Johnson and James W. Bommarito (San Francisco: Jossey-Bass, Inc., 1971). This handbook describes over 300 measures of child development for children under the age of twelve which are not available commercially. Each measure is classified and indexed, briefly described and has an available source listed.

These two sources have provided extremely worthwhile additions to the evaluation literature for early childhood education. However, each of these sources address itself to a different set of questions, and neither is sufficiently comprehensive in scope to cover the range of available tests. This project is an attempt to locate, review, classify, and abstract a more extensive set of measurement instruments and tests relevant to education and care programs for children from birth to age eight.

Procedure

Publishers' catalogs, test review, journals, and other measurement documents have been examined to obtain a list of appropriate instruments. Over 700 tests and measurement instruments have been located to date. In most instances sample copies of many of these tests have been or will be obtained for more systematic analysis; more expensive tests will be examined at various test distribution or library centers throughout the country.

As each test is received for review, it is given an accession number. The following information is also obtained:

1. TITLE (T) The actual title of the test.
2. AUTHOR (A) The listed author or authors.
3. SOURCE (S) The publisher of the test. If the publisher is unknown, then a possible source or reference is listed.
4. SPECIFICS (P) The cost, administration time, date of publication, scoring method, test forms, etc.

5. RESUME (R) An 80-100 word summary of test properties including data and kind of normative information, validation procedures, reliability, etc.

The above information is then coded onto IBM cards to facilitate later retrieval. An example of one such coding might be as follows:

T	0024	CALIFORNIA TEST OF MENTAL MATURITY, 1963 LONG FORM - LEVEL 0								
A	0024	ELIZABETH T. SULLIVAN, WILLIS W. CLARK AND ERNEST W. TIEGS								
S	0024	CALIFORNIA TEST BUREAU								
P	0024	C-SPEC=1.25, TEST=7.30/35, MANUAL=.75#D-1963 REVISION#S-HAND#T=48M								
R	0024	1963-REVISION NORMS BASED ON CHRONOLOGICAL AGE GROUPS BY I.Q., M.A.,								1
R	0024	PERCENTILES, STANDARD SCORES AND STANINES, GRADE PLACEMENT AND GRADE								2
R	0024	CHRONOLOGICAL AGE EQUIVALENT SCORES. KR21 RELIABILITIES RANGE FROM								3
R	0024	.48-.75 FOR THE TEST FACTORS, .71 FOR LANGUAGE, .79 FOR NON-LANGUAGE								4
R	0024	AND .86 FOR TOTAL SCORE. SHORT FORM OF TEST VALIDATED AGAINST								5
R	0024	STANFORD-BINET WITH CORRELATIONS RANGING FROM .71-.87.								6

The above citation means that the test given accession number 0024 is entitled "California Test of Mental Maturity, 1963 Long Form--Level 0." The authors are Elizabeth T. Sullivan, Willis W. Clark, and Ernest W. Tiegs and the publisher/source is the California Test Bureau. If an unknown publisher or private individual had been the source of this test, the address also would have been listed. The specifics of the test are given on Card "P" (see line 4 above). These parameters state that a specimen set costs $1.25, test booklets are $7.30 per 35, test manuals are $.75 each, this test is a 1963 revision of an earlier form, the test is scored by hand and takes 48 minutes to administer. The norms, reliability and validity coefficients are discussed on the remaining resume ("R") cards.

Test Content and Response Methodology

As stated previously, the National Program on Early Childhood

Education (NPECE) was interested in the evaluation of specific early childhood educational objectives. Since this evaluation was to be completed within a domain-referenced framework, we were interested in both item content and item format. Among the sources that we examined which reviewed available tests, little information existed about actual test content and response methodology. Thus, it would be important to include this information within the test review.

Test Content

The first step in this procedure was the development of a framework for classifying the objectives encountered pertaining to early childhood education. After extensive examination of existing tests, other taxonomic schemes, and discussion, a classification scheme based on four outcome domains--affective, cognitive, psychomotor and subject matter--was constructed as indicated below:

A. Affective Domain

01 Social Interaction

Cooperation; participation in group activities; relations with others in home, school or community; understanding of social standards of right and wrong and of role expectations; dominance; poise; sense of humor; acceptance of authority; patriotism; social courtesy; sharing

02 Emotional Reactions

Anxiety, frustration, reaction to novel situations, hostility, depression, nervous symptoms, aggressiveness

03 Behavioral Style

Initiating-withdrawing tendencies, active-passive, organized-disorganized

04 Motivation

Sustained involvement and interest in recreational or school related activities, delay of gratification, ability to set goals, competiveness, curiosity, general energy level; performance according to ability; persistence; need achiement

05 Personal Responsibility

Care of personal property, personal hygiene, responsibility for assumed tasks, self-sufficiency, autonomy-dependence

06 Personal Worth

Awareness of capabilities, confidence, satisfaction with self, feeling of belonging, worthiness, integrity, aspirations, pride

07 Aesthetic Appreciation

Music, art, beauty, self expression

B. COGNITIVE DOMAIN

01 Memory

Memorization of nonsense syllables, lists, designs, stories, or information under immediate or delayed conditions; following directions

02 Spatial Reasoning

Part-whole relations, means-end relations (mazes, paper-folding, block designs); transformations

03 Systematic Reasoning

Picture completion; sequences of events; logical conclusions or relationships of series of events (story endings); scrambled sequences

04 Relational Reasoning

Determination of basis of similarity or difference among items; incongruities; analogies, associations

05 Information

Vocabulary, concepts, facts

06 Creativity

Fluency, flexibility, originality, elaboration, closure

C. PSYCHOMOTOR

01 Eye-Hand Coordination

Copy basic shapes, tracing figures

02 Small Muscle Coordination and Kinesthetics

Holding pencil; using scissors; paper folding; bead stringing; tying; throwing ball to target

03 Large Muscle Dexterity and Motor Coordination

Rhythmic activities; body in space skills (rolling, tumbling, jumping, skipping, etc.); balance control

04 Sensorimotor Skills: Visual

Following with eyes; form and color distinction; figure-ground relationships

05 Sensorimotor Skills: Auditory

Timbre, pitch, volume differentiation, rhythm

06 Sensorimotor Skills: Tactile, Mass, and Thermal Sensitivity

Textural differentiation, discrimination of temperature changes, weight discriminations

07 Sensorimotor Skills: Olfactory and Gustatory

Smell and taste discriminations

D. SUBJECT MATTER DOMAIN

01 Basic Number Skills

Number symbols; relating numbers to objects; geometric terms (square, circle, triangle, etc.); counting by units, twos, threes, etc.; coin identifications; function and use of measuring instruments; quantitative concepts (few, many, smaller, longest, half, etc.); order relationships (first, second, middle, last, etc.); time relationships

02 Basic Language Skills

Letter symbols; positional terms (left, right, in front of, farthest, etc.); relating letters to sounds; tense meanings; relating sounds to words; plural meanings; rhyming, opposites

03 Arithmetic

Use of symbols for fundamental operations; operations involving fractions or decimals; set terminology

04 Reading

Word, sentence, paragraph, or story reading and/or comprehension

05 English

Punctuation, capitalization, word usage, grammar, spelling

06 Music

Singing, instrument playing, dance, knowledge of music fundamentals

07 Art

Form, structure, media distinctions; drawing, sculpture, craft activities

08 Foreign Languages

Written, oral comprehension or spoken fluency of a foreign language

09 Health and Safety

Physical development, accident prevention, knowledge of personal hygiene and nutrition

10 Science

Scientific facts and vocabulary in physical and in life sciences

11 Social Studies

Geography; environment; community, national or world affairs; history

12 Handwriting

Quality of printed or cursive script

13 Speech

Articulation of single consonants, consonant blends, digraph sounds, long and short vowels, pronunciation and inflection of sentences

Response Methodologies

An additional concern of the survey was a classification of the response methodologies with which certain early childhood educational objectives were being measured in the tests surveyed. It would not be surprising if a large number of the tests used recognition items as the primary assessment methodology but other types of item methods would be expected since many preschools use the words "recognize," "match," "identify," "copy," "reproduce," etc. within their objectives. By including item response types in the classification scheme it may be possible to get a better idea of the comprehensiveness of a particular measurement instrument.

The following categories of response methodologies were devised:

Response Methodologies

1. Matching (detection of sameness or difference; comparison standard always supplied; no labeling necessary), e.g., "Point to the color exactly like this one."

2. Recognition (selection of alternatives; no labeling necessary), e.g., "Point to the larger circle."

3. Identification (labeling is essential; requires recall), e.g., "What is this shape called?"

4. Written Production (creation of a written product using no comparison standard), e.g., "Draw a circle for me."

5. Oral Production (creation of oral response using no comparison standard), e.g., "Sing a song for me."

6. Manual Production (production of a manual or psychomotor skill), e.g., "Stand on one foot."

7. Written Reproduction (creation of a written product working from a visual standard), e.g., "Copy this letter for me."

8. Oral Reproduction (creation of an oral response working from an auditory standard), e.g., "Listen to this song. . . . Now, you sing that."

9. Manual Reproduction (reproduction of a manual or psychomotor skill working from a visual or kinesthetic standard), e.g., "Do a forearm balance like this one."

10. Categorization (grouping based on implied or explicit characteristics), e.g., "Point to all of the objects that belong in a kitchen."

11. Ranking (ordering along some dimension or in reference to one another), e.g., "Which one of these pictures shows what happened first? What happened next?"

12. Pair or N-item Comparisons (ordering in pairs along some polarized dimension), e.g., "Which do you like better 'ice cream or cake'?"

13. Ratings by Others (subjective evaluations by peers or adults), e.g., "How often does this child cry?"

14. Ratings by Child (subjective evaluation by the child himself), e.g., "How often do you cry?"

15. Estimation (subjective evaluation of something which can be measured objectively), e.g., "How long do you think this pencil is?"

Procedures

Once the objectives were classified and response methodologies were defined, the characterization of other features of the tests was begun. For each test at least one additional IBM card was necessary. The form for these cards was as follows:

cc	
1-4	Accession number of test
5	"_"
6	Minimum age appropriate for test
7	Maximum age appropriate for test
8	"_"
9	Alphabetical character denoting domain
10-11	Numeric characters denoting concept area within the domain
12-13	Numeric characters denoting the response methodology
14-78	5 column fields repeating the format of columns 9-13
79	Alphabetic character denoting group ("G") or individual ("I") administration or not applicable ("N")
80	"I" if a continuation card is necessary; otherwise, a blank

An example of this card for the previously discussed California Test of Mental Maturity, 1963 Long Form-Level Ø is:

1	2 3 4 5	6	7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35	75 76 77 78 79 80
	ØØ24-	4	8-BØ1Ø2DØ2Ø2BØ4Ø2DØ1Ø2BØ5Ø2 NNNN	G

This card indicates that instrument 0024 is suitable for ages 4-8 (columns 6 and 7) with the following fields decoded:

- BØ1Ø2 Cognitive domain ("B"), memory ("01") items of recognition ("02") type.
- DØ2Ø2 Subject matter domain ("D"), basic language skill ("02") items of recognition ("02") type.
- BØ4Ø2 Cognitive domain ("B"), relational reasoning ("04") items of recognition ("02") type.
- DØ1Ø2 Subject matter domain ("D"), basic number skill ("01") items of recognition ("02") type.
- BØ5Ø2 Cognitive domain ("B"), information ("05") items of recognition ("02") type.

Thus, all items are of a recognition response format. Column 79 indicates that this test is group ("G") administered and column 80 is blank, indicating no more of this type for this particular test follow.

Indexes

One obvious advantage of this classification system is the ease of retrieval. With this system, indexes can be compiled by hand-sorting or computer based on the following characteristics:

1. Alphabetical title of test with accession number.
2. Age or age range with test accession numbers
3. Test accession numbers within domain or concept area.
4. Source or author with test accession numbers.
5. Response methodologies with test accession numbers.

Response Taxonomy

Another advantage of the classification system is the ease of cross-classification. One important cross-classification is a response taxonomy of concept areas within a domain by response methodologies. Such taxonomies were the original goal of this research. Although the final taxonomies cannot be constructed until all tests have been classified, a simple taxonomy has been constructed from the first 70 tests classified. The taxonomy below is cross-classified with concept areas within the cognitive domain by response methodologies.

COGNITIVE DOMAIN \ RESPONSE METHODOLOGIES	01 Matching	02 Recognition	03 Identification	04 Written Production	05 Oral Production	06 Manual Production	07 Written Reproduction	08 Oral Reproduction	09 Manual Reproduction	10 Categorization	11-15 Other Methodologies	TOTAL
01 Memory		19	1	3			4	2	1			30
02 Spatial Reasoning	1	20		4			2		1			28
03 Systematic Reasoning		21		6	1					1		29
04 Relational Reasoning		36		1	2		1			1		41
05 Information		41	2	3	3							49
06 Creativity					1	1						2
TOTAL	1	137	3	17	7	1	7	2	2	2	0	179

Figure 1. Taxonomy of response methodologies by concept areas within the cognitive domain for the first 70 tests classified.

The various concept areas within the cognitive domain are distributed fairly evenly. However, almost 80 per cent of the test response methodologies fall within the recognition category. As a further example, these same tests were analyzed within the subject matter domain (Figure 2).

For the first 70 tests reviewed, basic number skills comprised over one-third of the items within the subject matter domain. Congruent with the cognitive domain, almost 80 per cent of the item response methodologies were recognition items.

SUBJECT MATTER DOMAIN / RESPONSE METHODOLOGIES	01 Matching	02 Recognition	03 Identification	04 Written Production	05 Oral Production	06 Manual Production	07 Written Reproduction	08 Oral Reproduction	09 Manual Reproduction	10 Categorization	11-15 Other Methodologies	TOTAL
01 Basic Number Skills		43	1	10	1							55
02 Basic Language Skills	1	22	1	1	1							26
03 Arithmetic		13		8								21
04 Reading	2	13										15
05 English		6		7								13
06 Music												0
07 Art		1										1
08 Foreign Languages												0
09 Health and Safety		2										2
10 Science		6	2		2							10
11 Social Studies		6	1									7
12 Handwriting				1								1
13 Speech		1						1				2
TOTAL	3	113	5	27	4	0	0	1	0	0	0	153

Figure 2. Taxonomy of response methodologies by concept areas within the subject matter domain for the first 70 tests classified.

Taxonomies could be constructed for the other two domains. However, those presented here are for illustrative purposes only. They

do show that there is a definite paucity of item response methodologies outside of the recognition type of item. Since the recognition item format is applicable across all domains and is adaptable for either individual or group testing, its predominance is understandable given the objective of efficient test administration. However, viewed from the angle of many preschool curricula, rich in both instructional techniques and in the variety of skills and activities expected as outcomes, limiting evaluation to only recognition responses seems to by-pass the issue of evaluating instructional objectives. Clearly what is needed is a much more varied selection from the assortment of available response methodologies outlined here rather than slavish dependence on one item type which is administratively simple.

Several additional indexes can now be added to the previous list. Included are:

6. Item concept areas by response methodologies with test accession numbers.
7. Item concept areas by response methodologies with test accession numbers within given age ranges.
8. Item response methodologies across domains with test accession numbers.

Conclusion

A major effort to provide quality preschool education programs in recent years has provided the impetus to develop new evaluation, measurement, and assessment instruments which are appropriate to these

age levels. However, many of these instruments have not been commercially published or have had limited application due to small-scale diffusion. It is hoped that the final results of this survey will enlighten preschool educators about the availability of existing instruments and stimulate additional research with more recently-developed instruments.

In addition, the most desirable outcome of this survey would be the demonstration of the limited availability of instruments which evaluate the full range of response methodologies. It is hoped that the few existing instruments available to fulfill this need will be utilized more extensively and will be extended to become more comprehensive tests assessing a wider domain of the content included in the objectives of early childhood education programs.